THE

INSTITUTE OF CHEMISTRY

OF

GREAT BRITAIN AND IRELAND.

FOUNDED, 1877. INCORPORATED BY ROYAL CHARTER, 1885.

LECTURE

ON

Chemists and the Patent Laws

By

HORATIO BALLANTYNE

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Contents.

References.

The cases cited are referred to in the "Reports of Patent Cases" as follows:—

[1] *Saccharin Corporation v. Chemicals & Drugs Co.*, R.P.C. *17* (1900), 28.

[2] *Aktiengesellschaft für Anilin Fabrikation v. Levinstein*, R.P.C. *31* (1914), 177; *38* (1921), 277.

[3] *Badische A. u. S. F. v. La Société Chimique des Usines du Rhone*, R.P.C. *14* (1897), 875; *15* (1898), 359.

[4] *J. Crosfield & Sons v. Techno-Chemical Laboratories*, R.P.C. *30* (1913), 297.

[5] *Monnet v. Beck*, R.P.C. *14* (1897), 777.

"*Z*" *Electric Lamp Mfg. Co. v. Marples, Leach & Co.*, R.P.C. *27* (1910), 305, 737.

[7] *Hatmaker v. J. Nathan & Co.*, R.P.C. *34* (1917), 317; *35* (1918), 61; *36* (1919), 231.

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Chemists and the Patent Laws.

1. Introductory.

When honoured by an invitation from the Lectures Committee to address you on this highly technical and, to many, recondite subject, I felt some hesitation owing to a doubt whether it could be made of sufficient general interest to the members of the Institute.

The relations of the professional chemist to the patent laws have not, I think, received hitherto any close consideration by the Institute. This circumstance is, perhaps, a little surprising when it is remembered that the patent laws of this and all other countries exist for the express purpose of fostering industry and developing new manufactures—a task upon which many of our Fellows and Associates are engaged. Chemical industries, no less than any others based upon scientific principles, respond to the stimulus of inventive genius or the patient elaboration of improved methods, and if these laws be really effective in accomplishing the objects for which they exist, they ought to be a matter of real moment to each one of us.

It must, I fear, be admitted that we chemists as a class, though with some notable exceptions, have hitherto shown a diffidence about availing ourselves of the advantages of our patent laws. The output of patented inventions—especially those of our more highly skilled chemists and those which break really new ground—has hardly been commensurate with the quality and number of the chemists engaged in industrial pursuits in this country. This fact, in my judgment, has been due in no small degree to a certain shyness, an unduly modest appraisement of the worth of our own achievements and professional capacity, and perhaps a temperamental reluctance to embark, in the midst of our regular duties and responsibilities,

upon those quests into the unknown which must be undertaken by every inventor who would accomplish anything worth recording.

To the few who are fully conversant with the subject, much that I have to say will be commonplace; but a strong conviction that the commonplaces of the few ought to be the commonplaces of the many, that an intelligent use of the patent laws will tend towards that professional advancement of chemists for which this Institute stands, and that under the stimulus of these laws chemists will give their best and most fruitful contribution to the industrial welfare of the nation, has encouraged me to bring these notes before you.

Let us begin with a glimpse at the history of the subject. The origin of all the patent laws in the world is to be traced back to that period of English history when the struggle between the prerogative of the Crown and the authority of Parliament was fast reaching a climax. A dispute, at the end of Queen Elizabeth's reign, about a breach of monopoly in the manufacture of playing cards brought to a head the growing abuse of the royal power, which had been claimed and exercised by successive monarchs, to grant monopolies and other privileges in trading, manufactures, and the importation of goods.

> "It was in the Parliament of 1601," says Macaulay, "that the opposition which had, during forty years, been silently gathering and husbanding strength, fought its first great battle and won its first victory. The ground was well chosen. The English sovereigns had always been entrusted with the supreme direction of commercial police. It was their undoubted prerogative to regulate coin, weights, and measures, and to appoint fairs, markets, and ports. The line which bounded their authority over trade had, as usual, been but loosely drawn. They therefore, as usual, encroached on the province which rightfully belonged to the legislature. The encroachment was, as usual, patiently borne, till it became serious. But at length the Queen took upon herself to grant patents of monopoly by scores. There was scarcely a family in the realm which did not feel itself aggrieved by the oppression and extortion which this abuse naturally caused. Iron,

oil, vinegar, coal, saltpetre, lead, starch, yarn, skins, leather, glass, could be bought only at exorbitant prices. The House of Commons met in an angry and determined mood. It was in vain that a courtly minority blamed the Speaker for suffering the acts of the Queen's Highness to be called in question. The language of the discontented party was high and menacing, and was echoed by the voice of the whole nation. The coach of the chief minister of the crown was surrounded by an indignant populace, who cursed the monopolies, and exclaimed that the prerogative should not be suffered to touch the old liberties of England. There seemed for a moment to be some danger that the long and glorious reign of Elizabeth would have a shameful and disastrous end. She, however, with admirable judgment and temper, declined the contest, put herself at the head of the reforming party, redressed the grievance, thanked the Commons, in touching and dignified language, for their tender care of the general weal, brought back to herself the hearts of the people, and left to her successors a memorable example of the way in which it behoves a ruler to deal with public movements which he has not the means of resisting."

This beneficient change, however, did not long continue. In the year 1603 James I. ascended the throne and quickly gave proof how little disposed he was to follow the example his illustrious predecessor had set. The king who degraded the royal prerogative by the sale of titles of dignity—"the title of baronet, which he originated, could be bought for £1000, a barony for £5000, and an earldom for £20,000"—was hardly a monarch to whom could be entrusted unfettered discretion in the bestowal of monopolies and privileges in trade and industry. The struggle between the Crown and Parliament was renewed and eventually resulted (in 1623) in the passing of the Statute of Monopolies, which declared void all sorts of monopolies and privileges *excepting* letters patent for inventions, and limited the latter to the term of fourteen years.

This Statute, which was the first formal patent law, which formed the basis of all subsequent British patent laws and, indirectly, those of all other countries, is of such fundamental

interest for our subject that the following extracts from its significant sections may be quoted:—

Section 1.—"All monopolies and all commissions, grants, licences, charters, and letters patent heretofore made or granted, or hereafter to be made or granted, to any person or persons, bodies politic or corporate, whatsoever, of or for the sole buying, selling, making, working, or using of anything within this realm or the dominion of Wales, or of any other monopolies, or of power, liberty, or faculty to dispense with any others; or to give licence or toleration to do, use or exercise anything against the tenor or purport of any law or statute; or to give or make any warrants for any such dispensation, licence, or toleration, to be had or made . . . are altogether contrary to the laws of this realm, and so are and shall be utterly void and of none effect, and in nowise to be put in use or execution."

Section 6.—"Provided also that any declaration before mentioned shall not extend to any letters patents and grants of privilege, for the term of fourteen years or under, hereafter to be made, of the sole working, or making of any manner of new manufactures within this realm, to the true and first inventor and inventors of such manufactures, which others at the time of making such letters patents and grants shall not use, so as also they be not contrary to the law, or mischievous to the State, by raising prices of commodities at home, or hurt of trade, or generally inconvenient."

It is a notable fact that the object of the Statute was not the creation of monopolies for inventions, but the abolition of monopolies in general; and it was only as something saved from the reforming deluge that the power of the Crown to grant letters patent for inventions was retained, with proper safeguards. One cannot but acknowledge the prescience of those who, in such a time of stress and strife, recognised the claim of the individual to his intellectual property, and appreciated the distinction between a conditional monopoly, which was the reward for the contributions of genius to the common good, from the capricious and irrational grants of privilege which

had clogged and hampered the free play of commerce and industry.

The question has sometimes to be considered, "What kinds of invention are patentable?" From the legal point of view Section 6 of the Statute just quoted supplied the answer. An invention, to be patentable, had to be a *manner of new manufacture*, and right down to the present day that has remained the chief element in the definition. Thus, in the Patents and Designs Act, 1907 and 1919, which is at present in force, we find, among "Definitions":—

> "'Invention' means any manner of new manufacture the subject of letters patent and grant of privilege within section six of the Statute of Monopolies. . . ."

A definition in such terms has, of course, been the subject of a great deal of discussion by the Courts during the past three hundred years, and the decided cases leave little doubt, as a rule, as to its ambit; but occasionally cases arise in which it is very difficult to say whether an improvement, of definite commercial value, is or is not a "manufacture" within the meaning of the Act.

It is not every ingenious innovation and improvement that can be accorded the protection of the patent laws. It has hitherto passed the wit of man to mitigate the inequality which exists in the treatment given to original, creative and meritorious work in the various domains of intellectual effort. I must not, however, be tempted to stray into a general discussion of the fascinating subject of the rights of the individual to the product of his brain and the reward to which his achievements should entitle him. We feel the contrast in several aspects of chemical work. The "pure research" worker is accorded no special privileges, however great and beneficent his contributions to knowledge. The chemist who devises a new method of analysis has often to expend as much real ingenuity, mental effort and perseverance over his work as the one who makes a patented invention. In publishing new and useful methods of analysis the chemist parts with that which, if kept to himself, might be to his personal advantage; but he places it freely at the disposal of his professional brethren. His reward lies, not in any special privileges, but in the regard and prestige which accrue to him.

To him may be aptly applied the definition, due, I believe, to Dean Inge, that "A gentleman is the man who tries to put into the common stock a little more than he takes out of it."

The patentee, however, may justly point to the fact that in truth no reward is granted to him by the patent laws, and that the only special treatment extended to him is the permission, if at all times he can make good his claim, to earn such reward as he can secure by his own efforts and by the just exercise of his monopoly for a limited number of years.

Our President (Mr. A. Chaston Chapman) and Sir J. J. Dobbie, as present and past members respectively of that distinguished body, the Royal Commission on Awards to Inventors, will, I am sure, agree that it is often extremely difficult, even with a knowledge of all the circumstances, to assess the degree of merit attaching to an individual for the improvements or advances, whether patentable or not, which he may claim to have made.

2. Patents and Industrial Research.

It would be impossible to express in terms of pounds, shillings and pence the magnitude of the influence which patents exert upon the development of manufactures in this country. It is unquestionably very great, and altogether transcends the outlay of time, effort and money involved in working out and patenting inventions. In our own domain it may safely be said that no living, progressive manufacture is altogether independent of patented inventions; the fortunes of not a few are altogether dependent upon them. In all works where chemists have a proper conception of their duty and of their value to themselves and the community, time and thought are devoted to improving the manufacture, and the best way of securing a recompense is, as a rule, to patent any invention which results. It is rarely safe to work as a secret any invention of real importance.

It might be thought, and has, indeed, been urged, that progressive development in the arts would occur just as freely if the stimulus of the patent laws were abolished—that the divine afflatus of the inventor would not be denied an outlet.

All experience points in the contrary direction; an enlightened self-interest is at the root of every sustained effort to introduce improvements. Chemical inventions, thrown open equally to all manufacturers, stand little chance of being put into practice. The inventor, even if prepared to go without reward, can by himself effect nothing; the co-operation of the manufacturer is essential; and no capitalist is willing to investigate a new invention, to incur the risk of loss and disappointment in developing it, if after he has proved its value everyone is to be free to use it.

The following figures, which relate not to the making or using of inventions, but merely to the outlay on official and professional assistance in applying for, obtaining and renewing patents, may serve as an index to the importance of the subject. In the year 1920 the total amount of fees, for patents only, received by the Patent Office was £420,472 and 36,672 new patent applications were received. Of the latter, it may be remarked, 311 were from women. The total number of Patent Agents on the register on the 31st December, 1920, was 309. If to the sums paid as fees to the Patent Office be added the incomes and salaries of the Patent Agents, their assistants and other employees, as well as the remuneration of a few other professional advisers, it would appear that the total amount paid by the patentees of this country, for these services only, amounts to over £1,000,000 per annum. That is an impressive figure. The outlays involved in making and testing the inventions before they are patented, the cost of installing plant, machinery, etc., for such of the inventions as are put into practice, and the expenditure in patenting the inventions in foreign countries, must amount to many times that sum.

As is well known, the British Government has in recent years definitely adopted the policy of taking part in the scientific development of industries and to that end has established the Department of Scientific and Industrial Research. Research is not the same thing as invention, but so closely are the two related and so frequently does the one merge into the other, that a natural result has been a considerable output of inventions of industrial value, including chemical inventions, by men working under the aegis of the Department.

A certain number of inventions have from time to time in the past been forthcoming from men engaged in the older Government Departments—the War Office, Admiralty, Post Office, etc.—and the war led to a great increase in the inventive activity of these Departments.

Questions relating to awards for inventions, patent rights, the advisability of the State itself taking out and owning patents, what to do with the patents when obtained, and so on, became too numerous and complex to be dealt with by the older methods, and accordingly an Inter-Departmental Committee, on which I had the privilege of sitting, was appointed, with the following terms of reference:—

1. To consider the methods of dealing with inventions made by the workers aided or maintained from public funds, whether such workers be engaged (*a*) as research workers, or (*b*) in some other technical capacity, so as to give a fair reward to the inventor and thus encourage further effort, to secure the utilisation in industry of suitable inventions and to protect the national interest, and

2. To outline a course of procedure in respect of inventions arising out of State-aided or supported work, which shall further these aims and be suitable for adoption by all Government Departments concerned.

The Report of this Committee has just been published. It is very short, and I would recommend it to the attention of the many Fellows and Associates of the Institute who are engaged either in Government service or on State-aided research. Its recommendations are far-reaching, and if carried out should benefit everyone concerned. As a study of the subject it will be found worthy of consideration by all who have occasion to look into such matters. For our present purpose its chief interest resides in the definite recognition that there exists, among State-aided research workers and men in the Government Service, such a body of inventive ability, such a fertility of ideas of industrial value, that some provision for dealing with the matter as a whole should have been found necessary.

If in due course the recommendations of the Committee are adopted, it may confidently be hoped, from such indications as

I have seen, that chemists will take an honourable place, as regards both the number and importance of their inventions, in the ranks of those whose achievements will fall to be adjudicated upon by the proposed "Inter-Departmental Patents Board."

3. Chemists and the Patenting of Inventions.

The patent laws offer advantages in a very special degree to chemists. The training and occupation of the chemist are not such as to produce the energetic, managing man of affairs. His work, as a rule, is of a contemplative nature; he is concerned more with the reactions involved in the process of manufacture and the conditions governing them, than with the devising of plant and machinery, or organisation of departments for production in quantity. Speaking generally, his contribution to improvements in chemical manufacture consists in initiating and working out, in its early stages, the fundamental principles of the process; he rarely gets further beyond that than some tests on a small-scale experimental plant. There his work on the invention ceases, unless, as is not usually the case, he has a natural aptitude for management and business. From that point onwards the development and daily commercial use of the process pass into the hands of the engineer or manager, who deservedly gets the credit of "producing the goods." Too often the real originator receives inadequate recognition for the success achieved; he occupies a subordinate post, and is called in only when difficulties arise, or for the routine control of raw materials and products.

To some extent this disparity of recognition may be rectified if the chemist records the advances, which he has made, by patenting them. The name of the first and true inventor must appear upon the specification, and the patent thus affords for all time a definite record of his personal achievement. If the conduct of the process passes out of his hands, his name nevertheless remains coupled with it.

To the young chemist his patent serves as a diploma which, whether the invention prove to be commercially valuable or not,

bears independent testimony to initiative, to some measure of ingenuity, on the part of the patentee. It is always a cause of gratification when applications for admission to the Institute are accompanied by such evidence of the capacity of the candidate.

Chemists as a rule entertain a somewhat exaggerated idea of the quantum of originality or scientific achievement that is necessary to justify them in applying for patents. I would not wish to advocate the cultivation of a habit of rushing off to the Patent Office with every little improvement, but, on the other hand, it is not wise to allow diffidence, or a lack of a right sense of perspective, to restrain one. I have a vivid recollection of a visit, some years ago, from two chemists who are now among our most distinguished Fellows, who came, blushing like a pair of school-girls, to discuss whether, by chance, there was anything worthy of patenting in what was really a brilliant chemical invention which they had made. To them the process, the outcome of prolonged investigations, seemed so obvious—once it was made, and consisting as it did of the application of a known chemical reaction to a particular new purpose—that they shrank from what seemed like patenting a platitude.

The tendency of the Courts, in my experience, is always to regard chemical inventions with special sympathy. The "inventive idea" is, as a rule, easier to formulate and envisage in these than in mechanical combinations.

It is not necessary that the invention be based on profound scientific conceptions or upon new reactions. Quite a small advance, judged from the purely chemical standpoint, if applied to the production of a new and useful result, may afford good subject matter.

There is a class of invention which I think is apt to be overlooked by British chemists, viz., inventions which consist in improvements in detail. The investigator works away, ascertaining the best conditions of concentration, proportions, temperatures, circulation of liquids, sequence of operations, and so on, and one by one small improvements emerge which are translated into practice with, in the aggregate, a substantially beneficial effect on the purity, yield, or cost of the product. Any chemist worthy of the name takes this sort of effort as a matter of course.

It is as well, however, to pause now and again on the journey up the hill and survey the scenery below from the new vantage point. Sometimes, though by no means always, it will be found that on crystallising the ideas which have served as guiding principles from stage to stage of the ascent, a real inventive conception will emerge. If he can patent the whole, he will secure to himself credit which may well be lost through considering each little advance by itself.

Inventions of this kind have hitherto appeared peculiar to the German type of chemist. The most striking and familiar example was afforded by the Badische patents for the manufacture of SO_3 by the contact process. Long before Knietsch tackled the problem it was known that, in order to produce SO_3 with platinum as catalyst, it was necessary to purify the gases. Knietsch set himself to purify the gases thoroughly and then more thoroughly—and in truth the essence of his invention consisted in "going one better" than anyone else in following the advice of earlier writers on the subject. He also ascertained by systematic experiments the optimum temperature for the catalysis and the best strength of sulphuric acid for absorbing the SO_3 produced. Looking back upon his work, it is seen to be nothing more, either in plan or in quality, than many of you—especially those engaged in the research laboratories of our great manufacturing companies—are engaged in every day. The point to notice is that at each stage of the development Knietsch and his assistants were doing what was more or less the obvious thing—improving in detail here and in detail there. The final outcome of these improvements was a series of real inventions of the highest merit, all bearing upon one another and producing a total result of a kind which long fascinated the chemical world. Inventions of this type cannot be made prophetically. However promising these chemists may at the outset have considered the contact process, they did not first conceive the ultimate invention and then work in faith to find ways of achieving it.

I would counsel our younger members not to pay too much regard, in advance, to the question of reward for their inventions. Let them aim high and take long views; it is the *making* of the invention, the intellectual exhilaration and the sense of contributing to the trend of progress, that are the sure reward.

Patentees as a class are inclined to over-estimate the monetary value of their own share in the successful development of an invention. In the admirable article on "Contracts of Service," largely due to Mr. Marlow, which appeared in the "Journal" of the Institute for June, 1921, page 199, the relation of the chemist to his employers is discussed, and I would commend what is stated on pages 207–208 to your attention. As a rule the chemist who makes useful inventions becomes too indispensable to be treated otherwise than generously. Directors, generally speaking, are reasonable men, and realise that success in manufacture is best achieved by retaining the services of their most competent men.

4. Some Elementary Principles and Examples.

It is not my intention, in giving some words of advice to young inventors, to deal with the subject of how to proceed in applying for patents. In all cases it is advisable to seek the advice and guidance of a good patent agent; the law and procedure are too intricate for the layman. This Institute includes among its members patent agents of the highest rank, and no inventor should have any difficulty in getting the assistance of men of the best chemical qualifications. It is superfluous to state that the Chartered Institute of Patent Agents has a standard of professional skill and conduct as high as that of our own.

A few remarks, illustrated by examples, may be offered on some of the elementary principles which sometimes occasion difficulty to chemists who approach the subject for the first time.

An invention, to be the subject of valid letters patent, must be novel and useful, and it must offer "patentable subject matter." The first two of these stipulations are easily understood, but the third without further elucidation conveys no definite meaning to the mind. An alternative mode of expression is that the invention "must involve the exercise of the inventive

faculty"; but this, while still being indefinite, is hardly appropriate to a large class of chemical inventions, to be referred to shortly, in which discovery is the prominent feature. There is, in fact, no more troublesome question in the whole range of patent law than that of subject matter, and by far the greatest number of disputes which have arisen in the past have centred round the issue of whether there was sufficient invention to support the patent. From the very nature of the subject, no satisfactory definition can be hoped for. Maxims and wise comments there are in plenty—the recorded judgments abound in them—but only too often these are of little service. When all is said and done, the judge has to form the best opinion he can, in the light of the evidence before him, and it not infrequently happens that the three successive tribunals differ sharply in the conclusions at which they arrive, on the basis of the same set of facts.

"Inventive ingenuity" normally conveys the idea of something being evolved either intuitively or by deliberate reasoning from one's inner consciousness. We picture the inventor as excogitating some new sequence of operations, new mechanical device or the like, and afterwards verifying his conceptions by embodying them in actual plant, machines, and so on.

Most mechanical inventions, and many chemical ones, originate in this manner. Chemistry, however, is distinguished from the mechanical sciences by the wide field which it offers for the discovery, as distinct from the excogitation, of new facts and processes capable of being usefully applied in manufacture. When a chemist, in the course of his experiments, stumbles across a new and quite unlooked-for compound, mixture, or reaction, which he sees to be of industrial value, it may be that the method of giving it practical application is self-evident, calling for no inventive ingenuity whatever. If, for example, the new observation is that on mixing two specified solutions a precipitate results, and the precipitate, or filtrate therefrom, is thought to be useful, it is at once obvious that the discovery may be applied by mixing the solutions in tanks or other appropriate vessels and afterwards separating the precipitate from the liquid by decantation, filtration, or otherwise, the whole operation being such as is familiar to everyone.

Such processes, assuming them to be novel and useful, generally afford excellent subject-matter; and some of the most unassailable patents are for inventions of this nature. The inventive act here consists in making the discovery, appreciating its significance, and pointing to a method of applying it to practical, manufacturing purposes. The essential consideration is that the process, though *qua* manipulation a familiar thing in itself, is here applied to new substances or under new conditions (*e.g.* conditions of temperature, proportions, concentrations or the like) to produce a new result.

In passing, it may be remarked that the mental process by which the patentee arrives at his invention is not a matter of which the law takes cognisance. The "new manufacture" is of equal value to the community, whether it be the result of sustained reasoning or mere accident, or even if it be imported from abroad.

One or two illustrative examples of inventions based upon mere change in the conditions may be given. In 1894 Monnet patented the manufacture of toluene sulphochlorides by acting upon toluene with chlorosulphonic acid in large excess (about 4 parts of acid to 1 of toluene) and keeping the mixture cooled to a temperature not exceeding 5°C. The reaction had previously been published by Claesson and Wallin, who, however, used only $2\frac{1}{2}$ parts of chlorosulphonic acid to 1 of toluene and did not cool the mixture so thoroughly, keeping it at 10° to 20° or even higher. Monnet obtained a higher yield than Claesson and Wallin of the mixed toluene sulphochlorides, and especially of the desired ortho-chloride. Notwithstanding the general similarity of the two processes, Monnet's patent was held to possess sufficient subject-matter.[1]

Pitt (Cassella) in 1896 patented the production of a black sulphur dye by heating together dinitrophenol, sodium sulphide and sulphur, the temperature of the mixture being gradually raised to 160°C.—generally in 2 to 3 hours. Owing to the fact that crystallised sodium sulphide contains 9 molecules of water-of-crystallisation and liquefies when mixed with sulphur to form a solution of sodium polysulphide, the mixture when heated was in fact an aqueous solution which boiled vigorously, with progressive formation of the black dye. In 1900 Abel (A.G.F.A.)

[1] *Saccharin Corporation v. Chemicals & Drugs Co.*, R.P.C. *17* (1900), 28.

patented a form of this process, which consisted essentially in substituting a prolonged boiling (for example, with the aid of an inverted condenser) for the shorter boiling of Cassella. Despite the fact that in the two processes the reagents, products and general nature of the reactions were so closely similar, Abel's patent was upheld.[2]

In 1892 the Badische Anilin und Soda Fabrik patented a process for the manufacture of the beautiful pink dyestuff, Rhodamine 6 G, which, according to one of the examples given in the specification, was to be obtained by heating together, in an autoclave, diethyl-rhodamine base, alcohol and ethyl chloride. A short time previously practically the same process had been described in a patent of Monnet, the only material difference being that in the Badische process any unaltered base was removed from the product by filtration of the solution, before the dyestuff was precipitated, whereas Monnet gave no direction to filter. To you the filtration of insoluble matter from a solution from which a dystuff was to be precipitated will doubtless appear such an obvious and natural step as to afford no basis for a patent. The judge, however, upheld the patent, so far as that particular attack on its validity was concerned.[3]

The lesson to be drawn from these and many other legal decisions to the like effect is that the chemist who has invented, either by discovery, experiment or by purely mental processes, some definite improvement in manufacture, which is new and not at that date obvious to persons of skill and knowledge in the art, may confidently count upon having material for a good patent, whether the invention be large or small. In the eye of the law the magnitude of the invention is an immaterial consideration, so far as the validity of the patent is concerned.

Having made your invention, any competent patent agent possessed of adequate chemical knowledge may, provided he is supplied with all the requisite information, be relied upon to do what is necessary in the important work of drafting the specification. It is absolutely essential, however, that the

[2] *Aktiengesellschaft für Anilin Fabrikation v. Levinstein*, R.P.C. *31* (1914), 177; *38* (1921), 277.

[3] *Badische A. u. S. F. v. La Société Chimique des Usines du Rhone*, R.P.C. *14* (1897), 875; *15* (1898), 359.

frankest and fullest disclosure of all relevant facts be made to him. If you feel that you can also crystallise what you conceive to be your invention into a short statement, extending to only two or three lines in length and specifying all its essential features, you will assist him by formulating it in that way. It is of special importance, in the case of chemical inventions, to attend to the following points:—

1. Try to ascertain, with scrupulous care, all the factors necessary for the successful performance of the invention, and, having done so, give in the specification full and clear information, illustrated by definite examples. I cannot too strongly press this counsel upon your consideration. A very large part of the costly litigation which has occurred in connection with chemical patents in the past has been due to "insufficiency" of this sort. I am happy to say that, so far as my experience goes, such faults are almost unknown in the specifications of British inventors. No doubt the defect, when it occurs, is to some extent due to the differences which exist in the requirements of the patent laws of different countries; but whatever the cause, the defect is a serious one from our own standpoint. The bargain between the Crown and the patentee requires that the informed public—in this case, competent chemists, skilled in the particular art—shall be placed by the specification in full possession of all the knowledge requisite for successfully using the invention, and anything short of a full disclosure not only imperils the validity of the patent, but is obviously unfair to the public. A "full disclosure" does not mean a dissertation on the subject; but it is better to furnish your patent agent with a lengthy description, from which he may select the essentials, than to run any risk of failure in this respect.

Two striking cases may be referred to as illustrations. In the patent of the Badische Anilin u. Soda Fabrik for the manufacture of Rhodamine 6 G, already referred to, one of the alternative methods given consisted in heating together "in an autoclave" specified quantities of diethyl-rhodamine hydrochloride and alcohol for a specified time at a specified temperature. In an infringement action brought by the Badische Company against M. Monnet's firm—with whom the invention

actually originated—an acute controversy arose as to whether the directions given in this example were sufficient to enable the invention to be successfully carried out. The simplicity and directness of the instructions appeared to leave no doubt about what had to be done. Fortunately an explanation of the differences between the parties emerged during the trial. Owing to the value of the dyestuff the Swiss firm, in order to prevent injury to the shade, were in the habit of using enamelled autoclaves, whereas the German manufacturers used plain iron autoclaves. It was ascertained that metallic iron—not in traces, but in substantial quantity—was a necessary ingredient of the charge if success was to result. The supply of iron, in the tests at the Badische works, had been derived from the walls of the autoclave, and the fact had escaped observation. Since the specification did not mention iron as one of the ingredients, the patent was declared void.[3]

Normann's patent of 1903 for the hydrogenation of oils specified the use of "fine nickel powder obtained by reduction in a current of hydrogen" as the catalyst, and in an infringement action the validity of the patent was challenged on the ground that the directions were insufficient. No information was given about the method of preparing the catalyst or the qualities it had to possess, although an allusion was made, at the beginning of the specification, to the work of Sabatier and Senderens on the hydrogenation of the gaseous hydrocarbons acetylene, ethylene, and benzene vapour. It was shown, during the trial, that unless the catalyst were prepared or used in special ways, not suggested by the specification, failure resulted. Even a catalyst having sufficient activity for the reactions investigated by Sabatier and Senderens might be quite useless for hydrogenising oils. Consequently the patent was declared void.[4]

2. Avoid the introduction of theory into your specification, unless the circumstances are very special and your patent agent considers it necessary—and in the latter case make plain that it *is* theory. The temptation to resort to theoretical conceptions in elucidating chemical inventions is sometimes very great; none

[3] *Badische A. u. S. F. v. La Société Chimique des Usines du Rhone*, R.P.C. *14* (1897), 875; *15* (1898), 359.

[4] *J. Crosfield & Sons v. Techno-Chemical Laboratories*, R.P.C. *30* (1913), 297.

but a chemist can appreciate how helpful, as a real, practical guide, chemical theory can be and generally is. Your invention, as formulated under the sagacious advice of your patent agent, may at first sight appear rather bare. You have been contemplating, perhaps, not only particular substances, but groups or whole classes of compounds; not reactions applicable only to a few, but general reactions such as your studies and experience have familiarised you with. Your patent agent sees, lurking in such broad ideas, the danger that the claims may extend to substances or to conditions of working which result in failure. There are cases, especially in the domain of organic chemistry, where it is almost impossible to avoid theory; it is then all the more necessary to seek the aid of a patent agent who has an adequate knowledge of chemistry to guide you.

Monnet, in 1892, discovered a new class of dyestuffs, which he conceived to be anisolines. He started by adding a solution of potassium hydroxide to the hydrochloride of one of certain known rhodamines, thereby obtaining, as he supposed, the "potassium salt" of the rhodamine. This product, which was really the rhodamine base, liberated by the potash, he then subjected to an alkylating process. The dyestuffs thus produced were of exceptional beauty and included the Rhodamine 6 G above referred to. The merit of the invention was beyond question. Unfortunately, owing to the mistaken theory, Monnet, in the patent already alluded to, claimed the production of the dyes by treatment of "the potassium salt" of the rhodamine, when in truth no such body existed and the invention, as claimed, was incapable of being carried out. The patent was held to be invalid.[5]

An interesting case, which may be contrasted with the foregoing, was that of Johnson's (Hollefreund's) patent of 1906, which related to the use of phospham (theoretically PN_2H) in the manufacture of filaments for electric incandescent lamps. Tungsten filaments when first introduced were liable to cause blackening of the lamp bulbs, a defect which, with some justification, the inventor ascribed to the presence of carbon in the filament. His invention consisted in using the phospham either as an ingredient of the carbonaceous paste used in making

[5] *Monnet v. Beck*, R.P.C. *14* (1897), 777.

the filaments, or by applying it to the filaments, glass stem, of other parts inside the finished lamp, thus "causing its decomposition products, obtained by heating *in vacuo*, to act on the filaments." The results were very good and the invention was largely used. According to the specification, the nitrogen of the phospham was released and combined with the carbon in the filament, removing it in the form of cyanogen or other compound. Analysis of the filaments showed that this action took place only to a limited extent, very little of the carbon being eliminated. It was also shown that if one had been able to employ—instead of the impure phospham obtainable on the market, or that produced by the text-book methods—the pure anhydrous substance, PN_2H, the chemical actions referred to could not take place. From the chemical standpoint, therefore, the patent seemed in a parlous condition. The Courts, however, upheld the patent, accepting the view that the specification was addressed to lamp-makers and not to chemists, that the error in theory would not mislead a lamp-maker in anything he had to do to obtain the promised results, and that he would use, not PN_2H, but the phospham procurable as already mentioned.[6] It will be noted that if, in the opinion of the Courts, the patent had been addressed to chemists, the decision would almost certainly have been reversed.

3. Do not overstate what the invention can accomplish. Nearly all inventors are enthusiasts, who do not relish seeing their inventions stated in modest terms. Now, if an invention consists in a process or apparatus, it is plain that no laudatory expressions can assist in describing that process or apparatus. Commonly it is an advantage to indicate what the object of the invention is; sometimes, but more rarely, it is advantageous to indicate what the invention is claimed in fact to achieve. Any such expressions, however, should be inserted only with the concurrence of your patent agent.

Just's patent of 1903 related to the drying of milk on steam-heated cylinders—a process which has been extremely successful in producing dried milk solids in powdered form. Instead of

[6] "*Z*" *Electric Lamp Mfg. Co. v. Marples, Leach & Co.*, R.P.C. *27* (1910), 305, 737.

contenting himself, however, with saying that that was the object in view, the patentee stated:—

"The dry milk solids obtained by my process have their natural taste and colour, are light and porous in form, and are sterilised and conservable. They are in so perfect a state that they can be restored to milk of excellent quality by the addition of hot water."

"By drying milk rapidly by the employment of a high temperature as above described I obtain the milk sugar as well as the other solids of milk in a dry but otherwise unaltered condition."

The Courts held that these were representations of fact on the basis of which the patent was granted, and that since, on the evidence, the milk solids were in truth altered, the result promised could not be attained, the consideration for the grant failed, and the patent was void.[7]

5. Foreign Patents.

The foregoing remarks refer to British patents. The various patent laws throughout the Empire do not differ greatly from our own, but in foreign countries the diversity, both of laws and practice, is so great that the guidance of a competent patent agent is at all stages necessary in the pursuit of applications there. The experiences of the patentee, who proceeds to protect his invention in a number of industrial countries abroad, are by no means always agreeable, and it is sometimes difficult to understand what principle underlies the objections raised by the examiners.

I would here venture to give expression to an earnest appeal to the Dutch Patent Office in particular, in the hope that it may reach those in authority there, to bring their attitude towards the would-be patentee more into line with that of other enlightened countries. From various quarters in this and other

[7] *Hatmaker v. J. Nathan & Co.*, R.P.C. *34* (1917), 317; *35* (1918), 61; *36* (1919), 231.

countries, complaints are frequently heard of the difficulties, apparently unreasonable, which applicants encounter at The Hague. It is to be feared that the deterrent effect will, in the long run, operate to the disadvantage of Holland, since capital cannot be attracted to industries, and especially new industries, if inventors are unable to secure patent protection as readily as in other manufacturing communities.

From time to time proposals have been made to institute "world patents." The project, even if desirable, appears to me quite impracticable. The various patent systems are so different in form and underlying conceptions, and are so deeply woven into the legal and industrial fabrics of the various countries, that it is out of the question to reduce them to a common pattern. Possibly something may be accomplished towards the establishment of Empire patents, but even here the difficulties seem formidable, and they tend to become more so as time goes on.

6. The Patents and Designs Act, 1919.

The Patents and Designs Act, 1919, which came into force on the 23rd December of that year, was of special interest to ourselves, in that it introduced into the Statute Law, for the first time, a section dealing specifically with chemical inventions, *i.e.* "inventions relating to substances prepared or produced by chemical processes."

Several other important alterations, which affected us as chemists equally with other members of the community, were made in the law, and I shall first refer briefly to a few of these.

The period of provisional protection was extended to nine months, and the term of the patent to sixteen years. These reforms were received with general approval.

A section entitled "Provisions for the prevention of the abuse of monopoly rights," which was received at first with much misgiving, but on closer study was seen to embody several valuable features, was introduced. The variety of the abuses dealt with by the section, the number of the remedies entrusted

to the Comptroller, and the fairness of the directions given to him for guidance in carrying out its provisions, all make for elasticity and reasonableness, and enable the Comptroller to adjust the remedy to the offence in a manner fair to all parties concerned.

A section was introduced having the effect that, if the defendant in an infringement action is held to infringe any valid claim of the specification, the Court is to give judgment in favour of the plaintiff on such claim, without regard to the invalidity of any other claim. This alteration in the law was well received by inventors and owners of patents, but I have doubts as to the wisdom of the change. The previously existing law, in my opinion, afforded adequate protection to a patentee. He could amend his specification at any time by deleting invalid claims; he could put his patent in order before launching an attack upon an alleged infringer; he was not bound to sue on an invalid patent. The tendency of the new law is to encourage patentees to take risks, as regards the scope of their claims, that they would not willingly have incurred before, with the result that an honest manufacturer, who is not inclined to face the uncertainties of litigation, may be warned off, by an invalid claim, from doing what he is perfectly entitled to do. This section, however, has not yet, so far as I am aware, been put into operation in any action, and possibly it will not prove to be an unmixed blessing to the plaintiff in the circumstances contemplated.

The extension of the grounds upon which the grant of a patent may be opposed, and the provisions as to patents indorsed "licences of right," both met with approval.

Turning now to the section dealing with chemical inventions, it may be remarked that the question whether a chemical product, as distinct from and apart from the process of obtaining it, could be the subject of a valid claim, had been a matter of academic discussion for many years prior to 1919. In the United States of America, product claims are allowed and are acted upon; in Germany and elsewhere on the Continent the practice is the reverse.

There was not, and never had been, any express statutory prohibition of such claims in this country. To the best of my knowledge the right to make them had never been questioned in any chemical patent action, and they had frequently appeared in

chemical specifications. In at least one action—that relating to the manufacture of aspirin (acetyl salicylic acid)—the suit was based upon a product claim.[8]

According to one school of thought a patent for a product would be invalid if it "amounted to a claim to something which, though new, is not in fact the result of the exercise of an art invented by the patentee." If the claim were "for a new product irrespective of the manner in which it had been brought into existence," it would be invalid "since it would not be for a manufacture at all."

According to the other view, a new product is no less a manufacture than is a new physical combination, such as a machine; and if, as a result of study, experiment and observation a chemist discovers a new and useful substance, he is quite as much entitled to a monopoly in the product, for a limited period, as in the method or methods of obtaining it.

Claims for machines, apparatus, and other physical assemblages of parts are allowable and are the commonest of all claims. The law does not enquire by what procedure or in what sequence the parts are constructed and assembled, and does not limit the patentee in that respect. If, as described in the specification, some of the parts are constructed by bolting pieces of metal together, the patent is not to be evaded by welding them together, casting them as one, or cutting them out as one from a single piece of metal; indeed, a substantial portion of the whole combination may be replaced by something of entirely different construction, provided it be a known mechanical equivalent. It is, in fact, the article, and not the process of making it, which is patented. No doubt it is the new manufacture which forms the basis of the patent, but in identifying or characterising that manufacture we look to the machine itself and not to any particular procedure in constructing it.

While fully realising that there is a great deal to be said for both opinions, I cannot help feeling that the standpoint of the modern, scientifically-trained chemist—and especially that of the organic chemist, skilled in research, of whom there are so many among us—has been imperfectly understood. When a

[8] *Farb. vorm. F. Bayer & Co. v. Chem. Fab. von Heyden*, R.P.C. *22* (1905), 501.

new and useful chemical compound is discovered and its constitution established, various avenues of approach, in preparing the compound, generally suggest themselves. To us the new body presents itself as a new combination of parts—not the levers, links, wheels and so on of the engineer, but the radicles and other groups of the chemist. We are familiar with general methods of synthesis, which quite commonly offer promising and alternative ways of arriving at a body of the particular structure indicated.

I see no reason why the new compound should not be patentable, and am sure you will agree that to limit the inventor's claims to the particular process used by him in preparing it, would be a hardship. Alternative processes might afford good subject matter for other patentees; but since, to use the apt simile, a dwarf seated on the shoulders of a giant sees further than the giant, it might well be that these subsequent processes would be better than the original, and the real founder of the new manufacture, if he had not a product claim, would be deprived of the fruits of his invention.

It cannot be said that this question had within recent years become at all an acute one, calling for settlement. No abuse of the rights conferred by such claims had arisen. It was with some dismay, therefore, that one found, in the abortive Patents and Designs Bill of 1917, proposals for abolishing claims to chemical products. The action taken by the Institute was duly reported in the "Proceedings" (1918, Part IV, page 9), and there is reason to believe it had a good effect, as the proposals, when re-introduced in 1919, were greatly modified for the better.

The Bill of 1917 afforded another example of the unfortunate tendency of those responsible for the drafting of legislative proposals affecting chemists to consider insufficiently the point of view of the chemists themselves. A large body of chemical manufacturers, traders, and users of chemicals are at present grievously affected by the uncertainty and confusion caused by the egregious phraseology of that part of the Schedule to the Safeguarding of Industries Act which relates to chemical commodities. One cannot help wondering how much trouble, expense and anxiety might have been spared by taking a little more care over the matter. When a certain policy has been

decided upon by Parliament, it ought to be given a fair opportunity of justifying itself, untrammelled by mere blunders in drafting which could easily be avoided. I shall not pause to discuss the Bill of 1917, but shall proceed at once to the section of the Act of 1919 with which we are concerned. That section, which applies only to patents applied for after the passing of the Act, is as follows:—

"(1) In the case of inventions relating to substances prepared or produced by chemical processes or intended for food or medicine, the specification shall not include claims for the substance itself, except when prepared or produced by the special methods or processes of manufacture described and claimed or by their obvious chemical equivalents: Provided that, in an action for infringement of a patent where the invention relates to the production of a new substance, any substance of the same chemical composition and constitution shall in the absence of proof to the contrary be deemed to have been produced by the patented process.

"(2) In the case of any patent for an invention intended for or capable of being used for the preparation or production of food or medicine, the comptroller shall, unless he sees good reason to the contrary, grant to any person applying for the same, a licence limited to the use of the invention for the purposes of the preparation or production of food or medicine but not otherwise; and, in settling the terms of such licence and fixing the amount of royalty or other consideration payable, the comptroller shall have regard to the desirability of making the food or medicine available to the public at the lowest possible price consistent with giving to the inventor due reward for the research leading to the invention.

"Any decision of the comptroller under this sub-section shall be subject to appeal to the court."

The first of these sub-sections has at least the merit that it clarifies and settles the law, and in my view it consitutes a fair and reasonable compromise between the two schools of thought.

It does not abolish product claims altogether; it allows claims for the substance itself when prepared or produced by the methods

described and claimed, or by their obvious chemical equivalents. In other words, the patentee's rights are not confined to the processes claimed, but extend to products obtained by other methods, if these are obvious chemical equivalents of the former. One could not be sure, in drafting a specification, that one had thought of every method available, and the sub-section relieves one of the necessity of taking anxious care in this respect. If an infringer hits upon a process which can be shown to be an obvious chemical equivalent, a product claim under this section should enable the patentee to obtain redress.

The proviso in the second half of the sub-section is particularly valuable as regards imported products. A chemical substance rarely affords *per se* any reliable proof of the method by which it has been manufactured, and if it were made abroad by an infringing process the patentee might have great difficulty in establishing his case. Under the old law, the onus of proof was upon the plaintiff; here it is thrown upon the defendant, and the presumption that the substance was made by the patented process will prevent abuses such as frequently occurred in the past.

The second sub-section, in my opinion, has little to justify it. It cannot but discourage inventors. As it left the House of Commons, however, it was even more objectionable, since it ended at the words "lowest possible price." The direction, and only direction, to the Comptroller in settling the terms of licence, etc., was, therefore, that he should have regard to the desirability of making the substance available to the public at the lowest possible price. This seemed to me a grievous wrong; one imagined what the state of mind would be of one of our members who, after much research, had invented a synthetic medicinal compound and learned that licences were to be granted on this footing. Representations were made while the Bill was in the House of Lords, and, whether for that reason or because he had himself observed the defect, Lord Moulton secured the addition of the final words as they now stand.

So far no serious difficulties have arisen in connection with this section.

Chemical industry is at present passing through a period of great difficulty and anxiety, and for the time being pioneer work

is perforce largely suspended. But one of the legacies of the war, as we well know who have observed the marvellous expansion of the Institute and its activities in the past few years, has been the growth of a spirit of keenness and steady enthusiasm among our young chemists, conscious of their strength and, as I firmly believe, only waiting for a favourable opportunity to justify themselves by their deeds. There is at present in these islands a larger body of younger men of proved capacity and manufacturing experience than ever before in our history. May we cherish the proud hope that with a return of industrial activity there will be forthcoming a generous and fructifying stream of chemical inventions, making a worthy contribution from the members of this Institute to the lasting prosperity of the nation.

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